

Title: Carbon monoxide Alarms in Private Rented Properties Impact Assessment No: RPC-14-CLG-2267 Lead department or agency: Department for Communities and Local Government Other departments or agencies: n/a	Impact Assessment		
	Date: 27/10/2015		
	Stage: Final		
	Source of intervention: Domestic		
	Type of measure: Secondary Legislation		
Contact for enquiries: Contactus@communities.gsi.gov.uk			
Summary: Intervention and Options			RPC Opinion: Green

Cost of Preferred (or more likely) Option			
Total Net Present Value	Business Net Present Value	Net cost to business per year (EANCB on 2009 prices)	In scope of One-In, Two-Out? Measure qualifies as
7.58	-9.04	0.83	Yes IN

What is the problem under consideration? Why is government intervention necessary?

Carbon monoxide poisoning is a serious and preventable form of poisoning. Each year there are around 40 deaths from accidental Carbon monoxide poisoning in England and Wales (Office for National Statistics Statistics) and in excess of 200 non-fatal cases that require hospitalisation. The Department has piloted alternatives to regulation approaches to help increase the uptake of Carbon monoxide alarms in private rented properties. However, while this has shown to be a cost-effective means of increasing uptake, there are high risk properties where the risk of Carbon monoxide poisoning is highest and therefore regulating for uptake in these properties is more socially desirable. Alongside this regulation, the Department intends to pursue its non-regulatory solutions more widely in order to boost uptake in households which do not have a Carbon monoxide alarm installed.

What are the policy objectives and the intended effects?

The objective of the policy is to help prevent carbon monoxide fatalities and injuries to private tenants by ensuring all private rented properties which are of higher risk to Carbon monoxide poisoning have a Carbon monoxide alarm installed.

What policy options have been considered, including any alternatives to regulation? Please justify preferred option (further details in Evidence Base)

1 – Do nothing - there are limited non-regulatory approaches aimed at raising awareness currently in place, though they are not specific to the private rented sector or targeted on higher risk properties.
 2 - Regulate for the installation of carbon monoxide alarms in private rented homes with solid fuel burning appliances. Separately, a large scale roll out of alternatives to regulation (specifically targeted behavioural change messaging) will also be pursued to help increase uptake in other private rented properties.

Will the policy be reviewed? It will be reviewed. If applicable, set review date: April 2017					
Does implementation go beyond minimum EU requirements?			NA		
Are any of these organisations in scope? If Micros not exempted set out reason in Evidence Base.		Micro No	< 20 No	Small No	Medium No
What is the Carbon dioxide equivalent change in greenhouse gas emissions? (Million tonnes Carbon dioxide equivalent)				Traded: NA	Non-traded: NA

I have read the Impact Assessment and I am satisfied that (a) it represents a fair and reasonable view of the expected costs, benefits and impact of the policy, and (b) that the benefits justify the costs.

Signed by the responsible
 SELECT SIGNATORY: Minister _____ Brandon Lewis _____ Date: 27/10/14 _____

Summary: Analysis & Evidence

Policy Option 1

Description: Regulate for the installation of carbon monoxide alarms in solid fuel burning private rented properties

FULL ECONOMIC ASSESSMENT

Price Base Year 2014	Present Value Base Year 2014	Time Period Years 10	Net Benefit (Present Value) (£m)		
			Low: 3.39	High: 11.77	Best Estimate: 7.58

COSTS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low		1.5	13.4
High		1.5	13.4
Best Estimate		1.5	13.4

Description and scale of key monetised costs by 'main affected groups'

Average annual cost of £0.8 million to business (landlords) of purchasing alarms (total present value (Present Value) £7.7 million). Average annual cost of £0.1 million to business (landlords) for the time taken to install alarms (total Present Value cost of £1.3 million).
Average annual cost of £0.6 million to non-business (tenants) of purchasing batteries (total Present Value cost of £4.3 million).

Other key non-monetised costs by 'main affected groups'

A time cost for non-business (tenants) installing batteries would be so minor as to be de minimis.

BENEFITS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low		2.0	16.8
High		2.9	25.2
Best Estimate		2.5	21.0

Description and scale of key monetised benefits by 'main affected groups'

Social benefit due to the policy resulting in an estimated 6-9 fewer fatalities and 306-460 fewer injuries over 10 years.

Other key non-monetised benefits by 'main affected groups'

Key assumptions/sensitivities/risks

Familiarisation costs are accounted for within the accompanying smoke alarm Impact Assessment. Value of each life saved in 2015 is £1.77m based on Department for Transport webtag data book. The value of each injury avoided is £24,457 based on Department for Transport webtag data book. For this policy to have a neutral Net Present Value the policy would need to prevent a total of 5 fatalities and 244 injuries over the 10 years of the policy. No additional enforcement costs for local authorities are assumed. Discount rate of 3.5% used throughout.

Discount rate (%)

3.5

BUSINESS ASSESSMENT (Option 1)

Direct impact on business (Equivalent Annual) £m:			In scope of One-In, Two-Out?	Measure qualifies as
Costs: 0.8	Benefits: 0	Net: -0.8		
			Yes	IN

Background to Impact Assessment

The Department published a discussion document of February 2014 (https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/283979/Review_of_Property_Conditions_in_the_Private_Rented_Sector_2_.pdf) which sought views on how best to improve property conditions in the private rented sector. We received a number of responses to this document that helped inform the policy. A consultation Impact Assessment was not produced alongside the discussion document but we consider a Final Impact Assessment at this stage to be sufficient for the following reasons:

- (a) There were no policy proposals made within the discussion paper; the purpose of the document was to simply canvass opinion on various possible policy measures;
- (b) There is already a market for carbon monoxide alarms so we know what the purchase costs of the alarms will be for landlords;
- (c) Other costs to business impacts such as the time costs from installing these alarms has been made using assumptions consistent with the accompanying smoke alarm Impact Assessments to ensure consistency;
- (d) There is data available on carbon monoxide poisoning deaths and injuries that enable us to calculate a social benefit from increasing the uptake of carbon monoxide alarms;
- (e) Where assumptions need to be made – such as the proportion of deaths and injuries from carbon monoxide poisoning that occur in private rented accommodation – no consultation would enable us to gather such information because this data is not recorded;
- (f) We have carried out appropriate sensitivity analysis to capture any uncertainty;
- (g) The Department has been testing alternatives to regulation and will be separately rolling out this approach more widely. However, a non-regulatory solution does not ensure a landlord will install a carbon monoxide alarm so regulation is required for the higher risk properties; and
- (h) Given the estimated cost of this policy, it would be disproportionate and costly for the Department to commission further research in this area in an attempt to gather further data. It is questionable whether any data could be gathered given where assumptions have been made it is because the data is not recorded. Therefore, research would simply delay the implementation of a socially desirable policy with minimal additional benefit;

Evidence Base (for summary sheets)

Problem under consideration and rationale for Government intervention

Carbon monoxide poisoning is a serious and preventable form of poisoning. Each year there are around 40 deaths from accidental Carbon monoxide poisoning in England and Wales (Office for National Statistics Statistics) and in excess of 200 non-fatal cases that require hospitalisation. While the Department plans to pursue an alternatives to regulation approach to helping increase uptake of Carbon monoxide alarms in the private rented sector (see below) to help prevent these fatalities and injuries, there are high risk properties where the risk of Carbon monoxide poisoning is highest and therefore regulating for uptake in these properties is more socially desirable. The following sections set out the policy objectives and rationale for intervention in more detail.

Policy objective

Since 2010 building regulations have required Carbon monoxide alarms to be fitted when a solid fuel appliance is installed or replaced. However, there is no requirement that homes with solid fuel appliances installed before 2010 have a Carbon monoxide alarm. By targeting regulations to require a Carbon monoxide alarm in private rented properties with these high risk appliances would impose no additional costs on the majority of landlords who will be outside the scope of these regulations.

Each year there are around 40 deaths¹ from accidental Carbon monoxide poisoning in England and Wales (Office for National Statistics) and in excess of 200 non-fatal cases that require hospitalisation. A recent Department of Health (DH) estimate based on the A&E Hospital Episode Statistics database shows that approximately 4,000 attend A&E each year diagnosed with Carbon monoxide poisoning. The latest data available from the English Housing Survey shows that only 15% of homes have a Carbon monoxide alarm.

Targeted regulations and a separate policy focussed on behavioural messaging campaigning is felt the best and most cost-effective way to reduce the number of deaths and injuries from Carbon monoxide poisoning in the private rented sector. This targeted action will improve the safety of tenants in the private rented sector and help reduce the number of fatalities and injuries while not imposing any burdens on the majority of landlords whose properties do not have pre 2010 solid fuel appliances in their properties.

Annex A provides information of DCLG discussion paper issued in February on improvement conditions in Private Rented Sector.

Alternatives to regulation

Over the past few months the Department has embarked on the testing of alternatives to regulation policies aimed at increasing the uptake of Carbon monoxide alarms in private rented properties. These pilots have involved working with local authorities who have contacted landlords with various forms of behavioural insight messaging aimed at increasing uptake of these alarms.

For the landlords who were contacted in a recent pilot with Leeds City Council, we estimate that there was a 7.5 percentage point increase in the proportion of privately rented homes installed with a Carbon monoxide alarm. This was achieved at minimal public sector cost and zero regulatory cost. However, as such an approach is entirely voluntary; it does not guarantee that a Carbon monoxide alarm will be installed in a property. In contrast, a regulatory solution would, though there are regulatory costs to achieving this which are set out in this Impact Assessment. As the policy objective is about securing an increase in Carbon monoxide alarms in higher risk properties, an alternative to regulation approach was not considered appropriate by itself. However, the Department plans to separately roll out a large scale alternatives to regulation approach focussed on behavioural insight messaging to help increase the uptake of Carbon monoxide alarms in more private rented properties.

Early next year we also plan to launch a suite of public safety radio broadcasts (similar to the Fire Kills broadcasts about domestic fire safety). These will be distributed via Cabinet Office to be broadcast free of charge on national and local radio networks.

We plan to work with trade bodies (letting agents, landlord's estate agents etc) as well as the Tenancy Deposit Scheme to promote the benefits of the Carbon monoxide alarms installations.

On September 11 a new Code of Practice for the Private Rented Sector was published. The Code is intended to promote best practice in the letting and management of private rented sector housing in England. To encourage landlords to install alarms the Code states that carbon monoxide detectors should be provided in all properties where a gas or solid fuel appliance is present.

As these alternatives to regulation approaches aimed at increasing the uptake of Carbon monoxide alarms in the private rented sector are separate to the proposed regulation, and given the voluntary nature and minimal cost of such non-regulatory approaches, this Impact Assessment focusses only on the costs and benefits of the policy that regulates for the installation of carbon monoxide alarms in private rented homes with solid fuel burning appliances.

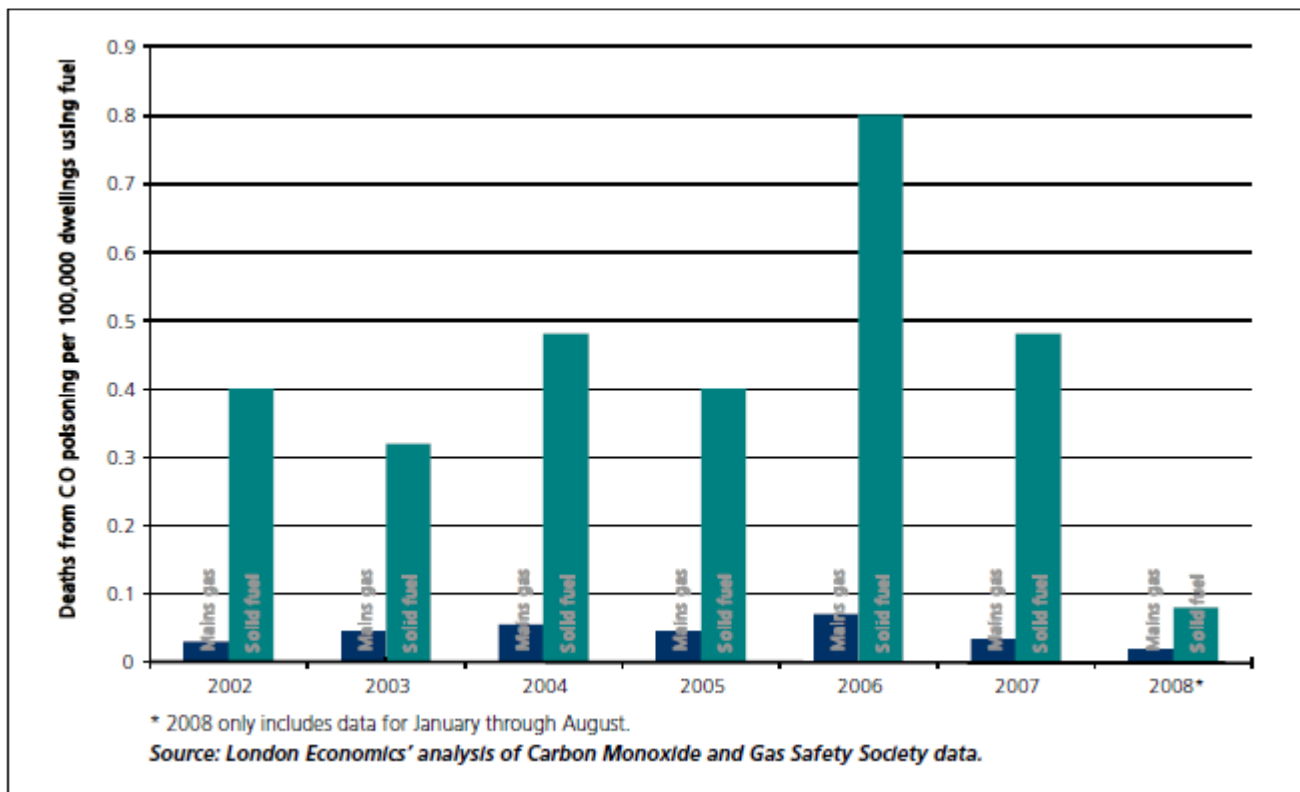
¹ <http://www.hse.gov.uk/gas/domestic/cross-government-group-1213.pdf>

Background and Rationale

The rationale for intervention is to help prevent deaths and injuries in the private rented sector from Carbon monoxide poisoning. There is currently no legal requirement for landlords to install a Carbon monoxide alarm in their property (except for homes with a solid fuel appliance installed post 2010). However, there is a social benefit from the installation of a Carbon monoxide alarm if it prevents deaths and injury. Carbon monoxide is a gas produced by incomplete combustion. It is colourless, odourless and tasteless. The effect of Carbon monoxide on people is to reduce the ability of the blood to carry oxygen. Concentrations of less than 100 parts per million can lead to mild poisoning, with symptoms including headaches and dizziness. Coma, collapse and death are the result from Carboxyhemoglobin levels of 60-70 per cent in healthy adults. In a properly functioning appliance the products of combustion, including Carbon monoxide, are discharged through the chimney and diluted in the atmosphere to non-hazardous levels. A build-up of Carbon monoxide in the heated space can occur due to a number of reasons: the appliance being faulty, misused, poorly installed or maintained; the flue being blocked and/or leaky; or inadequate ventilation in the room space. Though there is no central co-ordinated system for recording incidents, it is estimated that more than 40 people are killed and 200 injured from accidental carbon monoxide poisoning in the UK every year (all fuels and locations). Domestic Carbon monoxide alarms could reduce the number of deaths and injuries in homes by providing an audible warning to occupants that the level of the gas is above safe levels, allowing for safe evacuation.

Solid fuel appliances are responsible for a disproportionate number of carbon monoxide deaths and injuries compared to other combustion appliances (see chart below). The fitting of Carbon monoxide alarms would potentially save lives and prevent injuries. Introduction of a new requirement to fit Carbon monoxide alarms in properties with a solid fuel appliance would ensure these benefits would be realised in properties which are known to be the greatest risk. In addition, this would bring requirements for Carbon monoxide alarms in the private rented sector into line with existing building regulations that requires the Carbon monoxide alarms to be installed at the same time as any solid fuel combustion installations. Therefore, any future homes built, or retrofitted with solid fuel installations, would be captured by existing building regulations (2010) with regard to a Carbon monoxide alarm being installed. These regulations will not cover domestic gas appliances as the risk Carbon monoxide poisoning is very low as a result of the safety features required to be incorporated into the appliance by Gas Appliances (Safety) Regulations (implementing the Gas Appliances Directive 90/396/EEC) which first took effect 6th April 1992. Additionally landlords are already required to carry out an annual gas safety check which should identify any unsafe gas appliances.

Chart 1: Number of deaths from Carbon monoxide poisoning from mains gas and solid fuel per 100,000 dwellings



Source: Impact Assessment of Amendments to Building Regulations Part J

The mandatory installation of Carbon monoxide alarms will help reduce the level of deaths and injuries (both minor and serious) due to accidental Carbon monoxide poisoning from solid fuel appliances in England. It is important to note, as reflected in the methodology, that the benefits realised will relate to those dwellings that installed a Carbon monoxide alarm under the requirement only, and not all dwellings. The estimation of expected costs and benefits draws on five input figures:

- the likely long-term number of deaths and injuries (minor and serious) due to accidental poisoning by Carbon monoxide arising from solid fuel combustion appliances in a domestic setting;
- the expected effectiveness of Carbon monoxide alarms in preventing death or injury in a dwelling;
- the values of avoiding death and injury (minor and serious);
- the cumulative total number of alarm units installed under the requirement in each year; and
- the number of dwellings using a solid fuel appliance in the dwelling.

Evidence on Carbon monoxide deaths / poisoning

The National Health Service (NHS) indicate that in the UK, more than 40² people die from accidental Carbon monoxide poisoning every year, and 200 people are seriously injured. However, no data exists on the fuel type **and** location of the dwellings in which these accidents occurred.

The Office for National Statistics publishes data on the number of deaths occurring due to the toxic effect of Carbon monoxide. In 2007, there were 251 deaths due to Carbon monoxide poisoning in all buildings in England and Wales, 79 of which were unintentional, and 35 of which occurred due to exposure to gases and vapours in the home, from all fuel types. 31 of these were due to Carbon monoxide produced during uncontrolled building fires – and arguably may have been better warned by the installation of a smoke alarm. Again, no breakdown of these numbers by fuel type is possible.

The Carbon Monoxide and Gas Safety Society publish data on deaths caused by accidental Carbon monoxide poisoning, compiled from news items and coroners' reports. Of the 28 deaths from Carbon monoxide in buildings in 2007, 6 deaths occurred from accidental Carbon monoxide poisoning from a solid fuel appliance in a house, flat or bungalow.

² <http://www.hse.gov.uk/gas/domestic/cross-government-group-1213.pdf>

Data published by the Solid Fuel Association shows that in 2006-07, there were 8 incidents arising from Carbon monoxide from solid fuel appliances leading to 4 deaths and 8 injuries. Historical data shows that the number of deaths has stabilised in the 4-8 range since 2001/02, from a high of 20 deaths in 1997/98. The average rate of deaths per year since 2001/02 is 5.5 deaths.

Description of options considered (including do nothing);

1 - Do nothing – limited awareness raising through non-regulatory measures

Based on bespoke analysis of DCLG English Housing Survey data we estimate that 8.2% of private rented sector households have either a primary, secondary, or both, solid fuel burning appliance for heating the home. Appliances which were installed post-2010 would not be in scope as they would already have been captured by changes to the building regulations (2010) that stipulated that all solid fuel appliance installations would be required to have a Carbon monoxide alarm fitted alongside. Therefore, there are not estimated to be any on-going costs with respect to households going forward, and a one-off cost to business (landlords) for the installation of Carbon monoxide alarms in the existing stock.

Table 1 – Thousands of private rented properties with solid fuel heating

	Solid fuel main or secondary heating	
	pre-2010	all years
Thousands of households	336	354
Percentage of all private rented households	8.20%	8.60%

Source: DCLG English Housing Survey

Under the do nothing option we make the conservative assumption that none of the high risk households have a Carbon monoxide alarm (we could assume the national average of 15% of properties have a Carbon monoxide alarm installed but given the large degree of uncertainty we propose to be cautious and assume no uptake). We also assume that there will be an additional 3,262 high risk homes 'added' to the do nothing in each year of the policy (see assumptions list below)³. Existing building regulations for new build property already mandates that there must be a Carbon monoxide alarm installed in a new property, it is only existing private rented sector properties, or properties converted from other tenures, e.g. owner occupied, which will be affected by the regulations. This assessment assumes that all the growth identified above (3,262) are properties transferred from other tenures i.e. existing stock, rather than new build. We have assumed this in order to provide a conservative estimate with respect to calculating installation costs (see assumptions list below).

2 - Regulate for the installation of carbon monoxide alarms in private rented homes with solid fuel burning appliances. A large scale roll out of alternatives to regulation will also be pursued to increase uptake in other private rented properties

This option would require a working Carbon monoxide alarm to be installed in all properties with solid fuel burning appliance. As the data above highlights, these are also deemed to be of higher risk than other private rented properties. The regulation will also introduce powers for local authorities to install Carbon monoxide alarms in high risk private rented sector properties, and give them the power to retrospectively recover the installation costs from the landlord, as well as be able to fine the landlord. This option would mean that Carbon monoxide alarms would be installed in the 8.2% of higher risk private rented sector properties.

³ In the smoke alarms impact assessment we estimated that the number of private rented sector properties would increase by 39,780 in each year of the policy. Assuming 8.2% of these properties will be high risk results in 3,262 private properties added each year.

Monetised and non-monetised costs and benefits of each option (including administrative burden):

Assumptions

There is data available on the purchase cost of carbon monoxide alarms as well as Carbon monoxide deaths and injuries which have enabled us to give a best estimate of the likely cost to business and wider social benefit of the proposed policy. With all appraisals, there needs to be some assumptions made given we are forecasting potential impacts up to ten years into the future. This section sets out the key assumptions we have made and our justification.

Assumption one: Growth in households

The number of private rented properties has increased from 13.9% of all dwellings in 2008 to 18% of all dwellings in 2012/13⁴. In order to robustly appraise the impact of this policy we need to forecast the projected increase in the number of high risk private rented properties over the appraisal period. To do this we have estimated that 8.2%⁵ the number of private rented dwellings in 2012⁶ ($4,286,000 * 8.2\% = 351,452$) and increased it by 3,262 homes each year.

The increase of 3,262 homes continues throughout the policy and is based on data⁷ which shows that properties in the private rented sector account for 18% of total households. The 18% proportion has been multiplied to the average annual projected household formation projections for England, of 221,000⁸. The household formation projections is used as a proxy for future housing demand, and used by Local Planning Authorities as a basis for creating local plans for housing. However, house building has not exceeded this level for over 30 years.

In addition, because existing regulations for new build property already mandates that there must be a Carbon monoxide alarm installed for homes with a solid fuel appliance installed post 2010, it is only existing private rented sector properties, or properties converted from other tenures e.g. owner occupied which will be affected by the regulations. There will be a one-off cost associated with bringing existing stock to the new standard, plus on-going cost from the flow of properties into the private rented sector which are not new build. As there is not good information about the source of additional private rented sector properties – and it would be hugely disproportionate to commission research in this area relative to the scale of impacts - this assessment assumes that all the growth identified above (3,262) are properties transferred from other tenures i.e. existing stock, rather than new build. We have assumed this in order to provide a conservative estimate with respect to calculating installation costs.

Assumption two: Growth in carbon monoxide alarms

Installation rates of Carbon monoxide alarms are relatively low making forecasting uptake particularly problematic. Smoke alarm installation rates are a less useful guide because of the large scale non-regulatory approaches there have been in recent years and the higher risk of smoke-related deaths and injuries compared to Carbon monoxide poisoning. Therefore, to be conservative, in the counterfactual scenario we have assumed 100% of private rented sector properties do not have an Carbon monoxide alarm installed in the counterfactual for the 10 years of the policy. We thought this conservative approach ideal given the lack of data and the disproportionate cost to gather statistically significant data in this area relative to the forecast impacts.

Assumption three: Converting total carbon monoxide deaths and injuries into carbon monoxide deaths and injuries in private rented properties

Data on Carbon monoxide poisoning is not broken down by tenure so we do not know the proportion of these deaths and injuries which happen in the private rented sector. A simple assumption would be to assume that 18% of Carbon monoxide poisoning in the home occurs in private rented accommodation

⁴ English Housing Survey 2012/13: <https://www.gov.uk/government/statistics/english-housing-survey-2012-to-2013-household-report>

⁵ Based on bespoke DCLG analysis of English Housing Survey data

⁶ Dwelling Stock Estimates:

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/285001/Dwelling_Stock_Estimates_2013_England.pdf

⁷ English Housing Survey

⁸ Household Interim Projections, 2011 to 2021, England:

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/190229/Stats_Release_2011FINALDRAFTv3.pdf

with 18% being the share of private rented houses. However, in general the quality of the private rented housing stock is lower than other tenures and so is unlikely to give an accurate estimate.

Our favoured approach is to use data from the Gas Safety Trust which suggests that 'those renting from private landlords have been shown to be more at risk than those in other occupancy types' and of the number of report Carbon monoxide 'incidents', 47% occurred in privately rented properties.⁹ Therefore, we have assumed that 47% of Carbon monoxide-related deaths and injuries occur in the private rented sector. Given actual data is not collected in this area this represents the best assumption given data availability.

To estimate the number of deaths and injuries we have assigned probabilities of deaths and injuries occurring in the private rented sector. Using HSE¹⁰ data on the number of deaths in the home from Carbon monoxide poisoning gives a probability of death in a private rented home without a Carbon monoxide alarm of 0.0003%¹¹. The estimated probability of an injury in a private rented sector property without a Carbon monoxide alarm in this impact assessment is 0.0163%¹².

Assumption four: quantifying the reduced probability of death and injury from an increase in Carbon monoxide alarms

We have assumed that the existence of one Carbon monoxide alarm in a property – that is working and fitted properly – eliminates the probability of being killed or injured from Carbon monoxide poisoning in the home in question. Unlike in a fire where escape routes are critical, if a Carbon monoxide alarm were to 'go off', it is reasonable to assume that a tenant could then leave the property in question or get the appliance fixed. However, there will be instances where the alarm is installed incorrectly or where the alarm does not work. To account for this we have included an optimism bias factor to the forecast benefits equal to 25-50%. This assumption is consistent with a previous Impact Assessment undertaken in this area in Building Regulations¹³. This means the forecast benefits are reduced by 25-50%.

Assumption five: Time costs for landlords to install an alarm

An assumption has to be made regarding the time taken to install a Carbon monoxide alarm in a property. There is clear uncertainty with this and it is likely to vary. In the absence of any data on this and given proportionality, we have assumed it takes 15 minutes to install an alarm. We believe this is a conservative assumption as standard powered alarms require two simple screws to install it.

Assumption six: Time costs for landlords to familiarise themselves with legislation

We believe that the time taken for landlords to read and understand the legislation will be absorbed in the familiarisation costs we estimated in the Smoke Alarms in Private Rented Property's impact assessment. The regulations requiring both smoke and carbon monoxide alarms to be installed will be contained in the same statutory instrument, landlords will therefore only need to read and become familiar with one document and both requirements will be publicised together. To ensure that we do not double count the familiarisation costs we have accounted for the familiarisation costs in only the accompanying smoke Impact Assessment. .

Assumption seven: battery life

There are a wide range of Carbon monoxide alarms on the market meaning there is a wide variation in the life of the batteries which come with the alarm. To be conservative we are going to assume that batteries last 5 years after purchase. A 5 year battery life appears to be a common lifetime for many of lowest cost Carbon monoxide alarms. This means that Carbon monoxide alarms purchased by

⁹ Figure 8 in <http://www.gas-safety-trust.org.uk/wp-content/uploads/2013/03/DIDR-Report-2011-12.pdf>

¹⁰ Cross Government Group on Gas safety and carbon monoxide (Carbon monoxide) awareness annual report 2012/13: <http://www.hse.gov.uk/gas/domestic/cross-government-group-1213.pdf>

¹¹ This is based on dividing the number of deaths in private rented properties without an alarm (13) by the number of private rented properties in 2012 (4,286,000). The number of deaths in private rented properties without an alarm is an average of deaths from 2006 to 2012 from HSE data (28), which is then multiplied by 47%. 47% is taken from the Gas Safety Trust which suggests that 'those renting from private landlords have been shown to be more at risk than those in other occupancy types' and of the number of report Carbon monoxide 'incidents'.

¹² This is based on dividing the number of injuries in private rented properties without an alarm (699) by the number of private rented properties in 2012 (4,286,000). The number of injuries in private rented properties without an alarm takes the total number of Carbon monoxide injuries at home (4,200) and multiplies it the ratio of accidental Carbon monoxide poisoning in the home to all accidental Carbon monoxide incidents (0.356). This approach is used because of a lack of data.

¹³ <http://webarchive.nationalarchives.gov.uk/20120919132719/http://www.communities.gov.uk/documents/planningandbuilding/pdf/1527579.pdf>

landlords in 2015 will need the batteries replaced in 2020 at a cost to the tenants. We estimate the cost of batteries to be £3 per alarm¹⁴.

Assumption eight: non enforcement costs

The estimates of the number of Carbon monoxide deaths and injuries the regulations could prevent each year are dependent upon landlord compliance and on tenants regularly testing and buying new batteries. To help achieve this, we plan to introduce powers for councils to enforce the new requirements by allowing councils (when contacted by tenants) to install the smoke alarm and recover their full costs from the landlord who had not complied. The landlord would also face a fine.

1 - Do nothing – limited awareness raising through non-regulatory measures

In the “do nothing” option a limited level of awareness raising would be carried out aimed at increasing Carbon monoxide alarm uptake across all tenures. The costs associated with the “do nothing” approach will be the baseline against which the preferred option is compared.

Under the “do nothing” option there would continue to be fatalities and injuries in private rented sector properties which do, as well as do not, have a Carbon monoxide alarm installed. We have taken a conservative approach to the number of properties which have a Carbon monoxide alarm by assuming that no properties with a solid fuel appliance has a Carbon monoxide alarm. We do have evidence to suggest that 15% of all properties have a Carbon monoxide alarm, but this data is not broken down by tenure and fuel type. As we have narrowed our analysis down to homes with solid fuel appliances we were concerned about the robustness of assuming 15% of these properties as having a Carbon monoxide alarm. Given this data is not collected and given it would be disproportionate in terms of time and cost to gather this data relative to the expected impacts, we felt it was more appropriate to take a conservative approach of assuming zero private rented properties with a solid fuel application as having a Carbon monoxide alarm. The consequence of doing this is that the estimated cost to business may be slightly lower but we felt it was better to urge on the side of caution. However, we have also undertaken extensive sensitivity analysis to satisfy ourselves that our analysis is robust.

We estimate that in 2015 there will be 361,238 private rented sector properties without a Carbon monoxide alarm, which uses the number of high risk private rented dwellings in 2012¹⁵ ($4,286,000 \times 8.2\% = 351,452$) by 3,262 homes each year. An explanation of this assumption is given above. We further assume that, in the absence of regulations, we have taken the conservative approach that no private rented properties will have a Carbon monoxide alarm installed. And because of building regulations mean new build properties have to have a Carbon monoxide alarm installed we have used a conservative figure to increase the number of properties in each year of the regulation.

The number of deaths and injuries are calculated using changes in the probabilities of dying or being injured from Carbon monoxide as a result of the growth in uptake of Carbon monoxide alarms from current policy measures (the details of this calculation are explained above). In the 10 years of this policy we estimate there to be a total of 11 fatalities and 613 injuries as a result of Carbon monoxide poisoning in high risk private rented sector properties. As we have assumed no properties will have a Carbon monoxide alarm installed in the do nothing there will not be a direct cost for landlords of buying and fitting a Carbon monoxide alarm.

¹⁴ £3 for batteries was also used in the Smoke Alarms impact assessment.

¹⁵ Dwelling Stock Estimates:

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/285001/Dwelling_Stock_Estimates_2013_England.pdf

Option 2 - Regulate the use of Carbon monoxide alarms in private rented properties with a solid fuel appliance

Option 2 would mandate the installation of Carbon monoxide alarms in the 8.2% of high risk private rented sector properties. From 2015 all landlords of private rented properties with a solid fuel appliance in England will be required to have a Carbon monoxide alarm fitted. This means that the landlords of all of these properties in 2014 (357,976) would need to install an alarm, along with the landlords of 3,262 additional properties in each year of the policy, meaning when the regulation comes into force in 2015 landlords of 361,238 private rented properties would be expected to have a Carbon monoxide alarm installed. Over 10 years we estimate that landlords of 390,596 private rented properties would need to purchase Carbon monoxide alarms. This can be seen in table 4 in the annex.

Annual costs to business

There will be an on-going cost to landlords (business) of purchasing Carbon monoxide alarms. In option 1 we expect that in 2015 all high risk private rented sector properties will have a Carbon monoxide alarm installed. This means there will be an additional 361,238¹⁶ properties which will need at least one Carbon monoxide alarm purchased and installed in 2015.

We have assumed a cost for each alarm of £20, which is a conservative cost given the cost of a Carbon monoxide alarm starts at about £15 for a basic model¹⁷. In 2015 the 361,238 properties which will need to have an alarm purchased for results in a cost in 2015 for landlords of £7.2 million. In every year from 2016, 3,262 private rented sector properties will purchase a Carbon monoxide alarm. The total cost for landlords purchasing Carbon monoxide alarms over 10 years is an estimated £7.8 million, at a present value cost of £7.7 million. We have treated this cost as an on-going cost to business to be consistent with the methodology used for the Smoke Alarms impact assessment. If we were to count the costs incurred by landlords in the first year of the policy as a transitional cost it would not change the total costs and total present value costs. Table 5 in the annex provides a breakdown of these costs.

There will also be a time cost to landlords of installing Carbon monoxide alarms. We estimate it will take 15 minutes to install each alarm which is consistent with the accompanying smoke alarm Impact Assessment. The Annual Survey of Hours and Earnings (ASHE) 2013 median hourly wage for estate agents (£13.68) is used as a suitable proxy for landlord's cost of time. This has been uplifted by a factor of 1.3 to account for non-wage labour costs as suggested by the HMT Green Book.

Multiplying the hourly wage rate (£13.68) by 15 minutes results in a total time cost to landlords of £1.2 million in 2015. The total cost over 10 years is £1.34 million, at a present value cost of £1.32 million. Table 6 in the annex provides a breakdown of these costs.

As there were no costs to landlords in the do nothing, this means the additional cost to business of option 1 totals ranges from £9.1 million at a total present value cost ranging from £9.0 million.

Annual costs to tenants (non-business)

As we are assuming that newly purchased Carbon monoxide alarms will have batteries which last an average of 5 years, we expect there to be an on-going cost to tenants of buying batteries, as well as a time cost of tenants installing batteries, 5 years after the start of the policy. From 2020 the number of tenants purchasing batteries will be based on the number of properties which purchased a Carbon monoxide alarm five years earlier. In 2020 361,238 tenants will need to purchase batteries. In 2020 the cost for tenants replacing batteries will total £1.1 million based on a cost of batteries of £3¹⁸. Over the 10 years of the policy the cost for purchasing batteries for tenants will total £5.5 million at a Present Value cost of £4.3 million. Table 7 in the annex provides a breakdown of these costs. The time taken for tenants to install batteries would be so minor as to be de minimis.

¹⁶ Based on the 357,967 properties from 2014 which will need to install an alarm, plus the additional 3,262 properties which will become private rented in each year of the policy

¹⁷ Review of property conditions in the private rented sector, Page 15:
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/283979/Review_of_Property_Conditions_in_the_Private_Rented_Sector__2_.pdf

¹⁸ This cost is based on the same assumptions made for the smoke alarms impact assessment

Benefits

There will be social benefits from the lower number of fatalities and injuries because of this option. Given all landlords of high risk properties will have to install a Carbon monoxide alarm from 2015 it is possible there will be no deaths and injuries in high risk properties given the presence of the Carbon monoxide alarm (see assumption 4 previously). This means that a total of 11 deaths will be avoided and 613 injuries avoided as a result of this policy. However, there will be instances where the alarm is installed incorrectly or where the alarm does not work as well as any behavioural issues which mean batteries are sometimes not replaced. To account for this we have included an optimism bias factor to the forecast benefits equal to 25-50%. This assumption is consistent with a previous Impact Assessment undertaken in this area in Building Regulations¹⁹. This means the forecast benefits are reduced by 25-50%. After applying the optimism bias the number of deaths avoided ranges from 6-9 over 10 years and the number of injuries avoided ranging from 306-460 over 10 years.

To quantify the benefits of fewer fatalities and injuries we have used the Department for Transport (DfT) guidance to value the monetary benefit of saving a life and avoiding an injury as a result of a fire. The actual data is provided in DfT's Webtag databook²⁰. In 2015 the benefit of saving one life is quantified to be £1,796,126, this is calculated by taking the DfT value of life in 2010, of £1,632,892, and converting it into 2014 figures by using the Gross Domestic Product deflator in the DfT webtag databook. In line with DfT guidance the 2014 value of life has been uplifted for all of the following years by using the average annual growth of real Gross Domestic Product per person taken from DfT's webtag databook.

The monetary benefit of not having an injury from a fire is £24,457 which is also taken from the DfT webtag databook. The benefit per injury is based on a weight of DfT's value of a serious and minor injury based on HSE data²¹. The prices were scaled up from 2010 by using the Gross Domestic Product deflator from the webtag databook. From 2014 the value of an injury is increased yearly by the forecast for the annual average growth of real Gross Domestic Product per person from the webtag databook. We have discounted the benefits of fewer fatalities and injuries by 3.5% as per HM Treasury Green book guidance.

Given our range of deaths avoided (6-9) and injuries avoided (306-460) compared to the do nothing the total social benefit of option 1 ranges from £19.6 million to £29.5 million over 10 years, at a present value benefit ranging from £16.8 million to £25.2 million.

Summary of option 1

Option 1 results in a Present Value net benefit ranging from £7.7 million to £16.1 million over 10 years. The impact to business is a total Present Value cost of £9.0 million over 10 years, resulting in an EANCBC of £0.83 million in 2009 prices (further detail below in the on the direct costs and benefits to business calculations).

Rationale and evidence that justify the level of analysis used in the Impact Assessment (proportionality approach);

The analysis used throughout the evidence base makes use of a wide range of data sources which are referenced throughout the analysis, and these data sources drive most of our assumptions. Because the equivalent cost to business is £0.8 million per year we did not think it would be proportionate to undertake primary research to verify some of the optimism biases we have used, especially as it is unclear whether carrying out this research would be feasible and value for money and would delay the implementation of a socially desirable policy aimed at reducing deaths and injuries.

¹⁹ <http://webarchive.nationalarchives.gov.uk/20120919132719/http://www.communities.gov.uk/documents/planningandbuilding/pdf/1527579.pdf>

²⁰ <https://www.gov.uk/transport-analysis-guidance-webtag>

²¹ 5% weight applied to a serious injury and 95% applied to a minor injury based on HSE data: <http://www.hse.gov.uk/gas/domestic/cross-government-group-1213.pdf>

Risks and assumptions;

Direct costs and benefits to business calculations (following one in two out methodology);

Summary of total cost to business

Description	Total Present Value cost
Cost of landlords purchasing alarms	£7.7m
Time cost for landlords installing alarms	£1.3m
Total cost to business	£9.0m

Dividing the Present Value cost to business (£9.0) by the annuity rate²² results in an EANCB of £1.05 million in 2014 prices. Using the Gross Domestic Product deflator²³ we get an EANCB of £0.95 million in 2009 prices. Dividing this by the discount factor of 1.15²⁴ gives a 2010 base year cost to business of £0.83 million.

The equivalent annual direct cost to business is £0.83 million, in 2009 prices. This is based on landlords having to purchase a Carbon monoxide alarm (£20 per alarm) and the time taken (15 minute) for them to install each alarm.

Small and Micro Business Assessment

Wider impacts (consider the impacts of your proposals, the questions on pages 16 to 18 of the Impact Assessment Toolkit are useful prompts. Document any relevant impact here and by attaching any relevant specific impact analysis (e.g. SME and equalities) in the annexes to this template)

This legislation has not exempted small and micro businesses because small and micro businesses account for a large proportion of the private rented sector landlords. Data suggests that 74% of all landlords (cannot disaggregate if these are in the private rented sector) own one property and 95% of all landlords own between 1 and 4 properties²⁵. While this data does not inform us how many employees these landlords have, if any, it is highly likely that they will either be a small or micro business. Therefore exempting small and micro businesses would result in the policy failing to meet its objectives of reducing avoidable fatalities and injuries from fires. With a significant proportion of the landlords affected likely to be small and micro businesses we estimate that the impact on each landlord should be quite minimal. We estimate the cost of compliance for a landlord with one property ranging being £23.40²⁶.

Data from the Office for National Statistics²⁷ reveals that there are 42,305 businesses in England involved in 'renting and operating of own or leased real estate', which does not disaggregate for the different types of tenure a landlord can offer (private rented, social rented). But this data suggests that 87% of overall landlords are small and micro businesses, again showing that if small and micro businesses were exempt a large proportion of the benefits of this policy would not be achieved.

²² 10 year policy at a 3.5% discount rate. Annuity rate = 8.61

²³ Divide by 1.11. Gross Domestic Product deflator:

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/362193/Gross_Domestic_Product_Deflators_Qtrly_National_Accounts_September_2014_update.xls

²⁴ $1.035^{(2014-2010)}$

²⁵ Private Landlord Survey 2010: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/7249/2010380.pdf

²⁶ Cost of alarm (£20) + time cost for installing alarm ($0.25 * £13.68$) = £23.42

²⁷ UK Business: Activity, Size and Location, 2013: <http://www.ons.gov.uk/ons/rel/bus-register/uk-business/2013/rft---table-1.xls>

Summary and preferred option with description of implementation plan.

The preferred option is to regulate for the installation of Carbon monoxide alarms. The intention is to bring forward regulations in early 2015 these will be subject to the affirmative procedure and will require the approval of both Houses of Parliament. The estimates of the number of fire deaths and injuries the regulations could prevent each year are dependent upon landlord compliance and on tenants regularly testing and buying new batteries. To help achieve this, we plan to introduce powers for councils to enforce the new requirements by allowing councils (when contacted by tenants) to install the Carbon monoxide alarm and recover their full costs from the landlord who had not complied. The landlord would also face a fine. We will be engaging with Local Authorities on cost recovery and undertake a new Burden Assessment

Annex 1 – Calculations of costs

Table 1 – Number of deaths in the do nothing

Year	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
Number of high risk properties	357,976	361,238	364,500	367,762	371,024	374,286	377,548	380,810	384,072	387,334	390,596	
Percentage of private rented sector dwellings without Carbon monoxide alarm	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	
private rented sector dwellings without Carbon monoxide alarm	357,976	361,238	364,500	367,762	371,024	374,286	377,548	380,810	384,072	387,334	390,596	
Annual change in properties without Carbon monoxide alarm		3,262	3,262	3,262	3,262	3,262	3,262	3,262	3,262	3,262	3,262	
Probability of death	0.0003%	0.0003%	0.0003%	0.0003%	0.0003%	0.0003%	0.0003%	0.0003%	0.0003%	0.0003%	0.0003%	
Number of fatalities	1	1	1	1	1	1	1	1	1	1	1	11

Table 2 – Number of injuries in the do nothing

Year	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
Number of private rented sector properties	357,976	361,238	364,500	367,762	371,024	374,286	377,548	380,810	384,072	387,334	390,596	
Percentage of private rented sector dwellings without Carbon monoxide alarm	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	
private rented sector dwellings without Carbon monoxide alarm	357,976	361,238	364,500	367,762	371,024	374,286	377,548	380,810	384,072	387,334	390,596	

Annual change in properties without Carbon monoxide alarm	3,262	3,262	3,262	3,262	3,262	3,262	3,262	3,262	3,262	3,262	3,262	3,262	3,262	3,262
Probability of injuries in private rented sector given there isn't an alarm	0.0163%	0.0163%	0.0163%	0.0163%	0.0163%	0.0163%	0.0163%	0.0163%	0.0163%	0.0163%	0.0163%	0.0163%	0.0163%	0.0163%
Number of injuries	58	59	59	60	60	61	62	62	62	63	63	63	64	613

Table 3 – Number of deaths in option 1

Year	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total (2015-2024)
Number of high risk private rented sector properties	357,976	361,238	364,500	367,762	371,024	374,286	377,548	380,810	384,072	387,334	390,596	3,759,167
Percentage of private rented sector dwellings without Carbon monoxide alarm	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
private rented sector dwellings without Carbon monoxide alarm	357,976	0	0	0	0	0	0	0	0	0	0	0
private rented sector dwellings with Carbon monoxide alarm	0	361,238	364,500	367,762	371,024	374,286	377,548	380,810	384,072	387,334	390,596	3,759,167
Annual change in properties with alarm	361,238	361,238	3,262	3,262	3,262	3,262	3,262	3,262	3,262	3,262	3,262	390,596
Probability of deaths in private rented sector given there is an alarm per dwelling	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Number of fatalities	0	0	0	0	0	0	0	0	0	0	0	0
Number of deaths avoided	1	1	1	1	1	1	1	1	1	1	1	11

Table 4 – Number of injuries in option 1

Year	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total (2015- 2024)
Number of high risk private rented sector properties	357,976	361,238	364,500	367,762	371,024	374,286	377,548	380,810	384,072	387,334	390,596	
Percentage of private rented sector dwellings without Carbon monoxide alarm private rented sector dwellings without Carbon monoxide alarm	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
private rented sector dwellings with Carbon monoxide alarm	0	361,238	364,500	367,762	371,024	374,286	377,548	380,810	384,072	387,334	390,596	3,759,167
Annual change in properties with alarm		361,238	3,262	3,262	3,262	3,262	3,262	3,262	3,262	3,262	3,262	390,596
Probability of injuries in private rented sector given there is an alarm per dwelling	0.00000%	0.00000%	0.00000%	0.00000%	0.00000%	0.00000%	0.00000%	0.00000%	0.00000%	0.00000%	0.00000%	0.00000%
Number of injuries	0	0	0	0	0	0	0	0	0	0	0	0
Number of injuries avoided	58	59	59	60	60	61	62	62	63	63	64	613

Table 5 – Landlord cost of buying alarms

Year	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	10 year total
Total number of private rented sector dwellings	357,976	361,238	364,500	367,762	371,024	374,286	377,548	380,810	384,072	387,334	390,596	3,759,167
% of private rented sector dwellings without Carbon monoxide alarm	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

private rented sector dwellings with Carbon monoxide alarm	0	361,238	364,500	367,762	371,024	374,286	377,548	380,810	384,072	387,334	390,596	3,759,167
Additional home		361,238	3,262	3,262	3,262	3,262	3,262	3,262	3,262	3,262	3,262	390,596
Cost per alarm		£20.00	£20.00	£20.00	£20.00	£20.00	£20.00	£20.00	£20.00	£20.00	£20.00	£20.00
Total cost (millions)		£7.2	£0.1	£0.1	£0.1	£0.1	£0.1	£0.1	£0.1	£0.1	£0.1	£7.8

Table 6 – Landlord time cost for installing alarms

Year	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	10 year total
Total number of private rented sector dwellings	357,976	361,238	364,500	367,762	371,024	374,286	377,548	380,810	384,072	387,334	390,596	3,759,167.0
% of private rented sector dwellings without Carbon monoxide alarm	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
private rented sector dwellings with Carbon monoxide alarm	0	361,238	364,500	367,762	371,024	374,286	377,548	380,810	384,072	387,334	390,596	
Additional home		361,238	3,262	3,262	3,262	3,262	3,262	3,262	3,262	3,262	3,262	3,262
Hourly wage rate		£13.68	£13.68	£13.68	£13.68	£13.68	£13.68	£13.68	£13.68	£13.68	£13.68	£13.68
Time taken		0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Total cost (millions)		£1.2	£0.0	£0.0	£0.0	£0.0	£0.0	£0.0	£0.0	£0.0	£0.0	£1.34

Table 7 – Tenant cost of buying batteries

Year	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	10 year total
private rented sector dwellings with Carbon monoxide alarm	0	361,238	364,500	367,762	371,024	374,286	377,548	380,810	384,072	387,334	390,596	
Cost of batteries		£3.00	£3.00	£3.00	£3.00	£3.00	£3.00	£3.00	£3.00	£3.00	£3.00	£3.00
Cost of buying batteries (millions)		£0.0	£0.0	£0.0	£0.0	£0.0	£1.1	£1.1	£1.1	£1.1	£1.1	£5.5

